

# **VOIP MODEL FOR ICT RURAL COMMUNITIES TELECENTRE IN SINTOK**

**ALATEEBY SAAD MOHMAD**

**UNIVERSITY UTARA MALAYSIA  
2012**

**VOIP MODEL FOR ICT RURAL COMMUNITIES  
TELECENTRE IN SINTOK**

**A project submitted to Dean of Research and Postgraduate Studies  
Office in partial Fulfilment of the requirement for the degree  
Master of Science (Information and Communication Technology)  
University Utara Malaysia**

**By  
ALATEEBY SAAD MOHMAD**

**DEAN OF AWANG HAD SALEH GRADUATE SCHOOL  
UNIVERSITY UTARA MALAYSIA**

**PERMISSION TO USE**

In presenting this project in partial fulfilment of the requirements for a postgraduate degree from Universiti Utara Malaysia, I agree that the Universiti Library may make it freely available for inspection. I further agree that permission for the copying of this project in any manner in whole or in part, for scholarly purpose may be granted by my supervisor(s) or in their absence, by the Dean of Awang Had Salleh Graduate School. It is understood that any copying or publication or use of this project or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my project.

Requests for permission to copy or to make other use of materials in this project, in whole or in part, should be addressed to:

Dean of Awang Had Salleh Graduate School  
College of Arts and Sciences  
Universiti Utara Malaysia  
06010 UUM Sintok  
Kedah Darul Aman  
Malaysia

## **ABSTRACT**

Transmission of Voice over Internet Protocol (VoIP) on packet switching networks is one of the rapidly emerging real-time applications. VoIP is a formation of audio and voice communication. It receive voice signal activities then encoded in digital form and divided into small parts of information as like voice data network packets. These data network packets are decoded and transmitted voice in signals then sender and receiver having a voice conversion. In a voice conversion, the clients send and receive packets in a bidirectional method. Each client work as a sender and as a receiver depends on the direction of traffic flow over network. The aim of this proposal is to propose a VOIP model for ICT rural community's telecaster in Sintok.

## ACKNOWLEDGMENTS

With a grace of the almighty (God), this thesis is a culmination of long period of time of effort where I have been accompanied and supported by many. I am extremely grateful to my supervisors, **Dr. Kashif Nisar** for taking responsibility of my master thesis. His wide knowledge and logic way of thinking have been great value for me. His understanding, encouraging and personal guidance have provided a good basis for the present research.

Most importantly, none of this would have been possible without the love and patience of my parents, my immediate family, to whom this work is dedicated to. They have been a constant source of love, concern, support and strength all these years. I would like to express my heart-felt gratitude to my family. My extended family has aided and encouraged me throughout this endeavor. I warmly appreciate the generosity and understanding of my extended family.

I owe my loving thanks to my eldest brother. He had been a role model for me to follow unconsciously when I was a teenager and has always been one of my best counselors, without his encouragement and understanding, it would have been impossible for me to finish this work. My loving thanks are due to University Utara Malaysia (UUM) for giving me the chance to be one of its students.

Alateebby Saad Mohmad

## Table of Contents

PERMISSION TO USE	i
ABSTRACT	ii
ACKNOWLEDGMENTS	iii
Table of Contents	iv
List of Tables	vii
List of Figures	viii
CHAPTER ONE : INTRODUCTION	1
1.0 Introduction	1
1.1 VoIP Protocol Architecture	3
1.2 Problem Statement	5
1.3 Objectives of this Study	6
1.4 Contributions of This Report	7
1.5 Structure of This Report	7
CHAPTER TWO : LITERATURE REVIEW	8
2.0 Literature Review	8
2.1 Telecentre Initiatives in Malaysia	9
2.2. Rural ICT Development and Implementation	11
2.3 Smart Partnerships in Rural ICT Development	13
CHAPTER THREE : RESEARCH METHODOLOGY	19
3.1 Introduction	19

3.2	Research Design	19
3.3	Evaluation Research	20
3.3.1	Planning step	22
3.3.2	Gathering data	23
3.3.3	Reporting result	24
3.4	Summary	28
CHAPTER FOUR : Results and Findings		29
4.0	Results and Findings	29
4.1	Possible Solutions to Pricing Challenges	30
4.2	Possible Solutions to Policy and Regulatory Challenges	31
4.3	Possible Solutions Towards Competitive Business Solutions	32
CHAPTER FIVE : Conclusion		32
5.0	Conclusion	34
REFERENCES		35

### **List of Tables**

Table 1.2 Classifications of Phone Systems	5
Table 3.1 Description of Telecentres in Study	25
Table 4.1 Telecentre Distribution by Agencies	29



### **List of Figures**

Figure 1 VoIP Protocol Architecture	4
Figure 2.1 Telecentre in Malaysia	10
Figure 2.2 The Leavitt “Diamond” Components of the Organization	12
Figure 2.3 Components of CPPA Smart Partnership	14
Figure 3.1: Evaluation Assessment Process	22
Figure 3: Sustainable Telecentre Competitive Business Solutions	32

# **CHAPTER ONE**

## **INTRODUCTION**

This chapter mainly focuses on introducing the research aims, background, and the current issues towards improving the VoIP model for ICT Rural Communities Telecentre. In addition, this chapter addresses the research solutions along with the relevant research questions in way that well avoid the current problem and to improve it, which involves VoIP over a wireless local area network (WLAN) network. Finally, research process is introduced in order.

### **1.0 Introduction**

Information and communication technologies (ICTs) have been widely used as solutions to improve organizations. ICT had empowered users in organization to improve productivity through increased efficiency to collect, process, store, and disseminate data and information to enable managers to plan, operate, monitor and make better decisions. Users are able to gain knowledge and improve competency as well as worked together from anywhere, any time through the connectivity to the internet.

Transmission of Voice over Internet Protocol (VoIP) on packet switching networks is one of the rapidly emerging real-time applications. VoIP is a formation of audio and voice communication. It receive voice signal activities then encoded in digital form and divided into small parts of information as like voice data network packets. These data network packets are decoded and transmitted voice in signals then sender and receiver having a voice conversion [1], [2]. In a voice conversion, the clients send and receive packets in a bidirectional method. Each client work as a sender and as a receiver depends on the direction of traffic flow over network [3].

The contents of  
the thesis is for  
internal user  
only

## REFERENCES

- [1] V. Soares, P. Neves, and J. Rodrigues, "Past, Present and Future of IP Telephony," *International Conference on Communication Theory, Reliability, and Quality of Service, Bucharest*, pp. 19–24, 05, July. 2008.
- [2] R. Beuran "VoIP over Wireless LAN Survey," *Internet Research Center Japan Advanced Institute of Science and Technology (JAIST,) Research report. Asahidai, Nomi, Ishikawa, Japan*, pp. 1-40. 2006.
- [3] K. Nisar, A. Said and H. Hasbullah, "Enhanced Performance of WLANs Packet Transmission over VoIP Network," *2010 IEEE 24th International Conference on Advanced Information Networking and Applications, Workshops, (AINA 2010), supported by IEEE Computer Society, Perth, Western Australia*, pp. 485-490, 20-23 April. 2010.
- [4] L. Cai, Y. Xiao, X. Shen, and J. Mark, "VoIP over WLAN: Voice capacity, admission control, QoS, and MAC," *International Journal of Communication System, Published online in Wiley Inter-Science, Waterloo, Ontario, Canada*, Vol. 19, No. 4, pp. 491-508, May. 2006.
- [5] V. Mockapetris, "Telephony's next act," in *IEEE Spectrum, Nominum Inc., Redwood City, CA, USA*, Vol.43, No. 4, pp. 15-29, 08, May. 2006.
- [6] P. Dely "Adaptive Aggregation of Voice over IP in Wireless Mesh Network," *Master's Project, Department of Computer Science, Karlstad University*, 28, Jun. 2007.

- [7] M. ALAkhraS, "Quality of Media Traffic over Lossy Internet Protocol Networks: Measurement and Improvement," *PhD thesis, Software Technology Research Laboratory, De Montfort University, United Kingdom, 2007.*
  
- [8] H. Chong and H. Matthews, "Comparative analysis of traditional telephone and voice-over-Internet protocol (VoIP) systems," *Electronics and the Environment, 2004. Conference Record. 2004 IEEE International Symposium, Pittsburgh, PA, USA*, pp. 106-111, 24, May. 2004.
  
- [9] A. Lindgren, A. Almquist, and O. Schelen, "Evaluation of quality of service schemes for IEEE 802.11 wireless LANs," *26th Annual IEEE Conference on Local Computer Networks, Tampa, FL, USA*, pp. 348-351, 06, August. 2002.
  
- [10] L. X. Cai, X. Ling, X. Shen, J. Mark, and L. Cai, "Supporting voice and video applications over IEEE 802.11n WLANs," *Journal on Wireless Networks, Springer Science, Victoria, BC, Canada*, Vol. 15, No. 4, pp. 443-454, November. 2009.
  
- [11] S. Ehlert, G. Zhang, and T. Magedanz, "Increasing SIP Firewall Performance by Ruleset Size Limitation," *IEEE PIMRC 2008, VoIP Technologies Workshop, Cannes, France*, September. 2008.
  
- [12] H. Hasbullah, K. Nisar and A. Said, "The Effect of Echo on Voice Quality in VoIP Network," *International Association for Science and Technology Development (IASTED) Journal, Calgary, Canada, Advances in Computer Science and Engineering (ACSE) 2009 Phuket, Thailand. 2009.*

- [13] K. Nisar, A. Said and H. Hasbullah, "Enhanced Performance of Packet Transmission Using System Model Over VoIP Network," *International Symposium on Information Technology 2010 (ITSim 2010)*, IEEE, KLCC, Kuala Lumpur, Malaysia, pp. 1005-1008, June, 17. 2010.
  
- [14] K. Nisar, A. Said and H. Hasbullah, "Enhanced Performance of IPv6 Packet Transmission over VoIP Network," *2nd IEEE International Conference on Computer Science and Information Technology, 2009, ICCSIT, Beijing, China*, pp.500-504, August, 11. 2009.
  
- [15] K. Nisar, A. Said and H. Hasbullah, "Internet Call Delay on Peer to Peer and Phone to Phone VoIP Network," *International Conference on Computer Engineering and Technology 2009 (ICCET 2009) IEEE, Singapore*, Vol. 2, pp. 517-520, 24, January. 2009.
  
- [16] Y. Xiao, "IEEE 802.11n: enhancements for higher throughput in wireless LANs," *IEEE Wireless Communications, TN, USA*, Vol. 12, No. 6, pp. 82-91, 19, December. 2005.
  
- [17] A. Floros, M. Avlonitis AND P. Vlamos "Frequency-Domain Stochastic Error Concealment for Wireless Audio Applications," *Mobile Networks and Applications, SpringerLink, Corfu, Greece*, Vol. 13 No. 3, pp. 357-365, 4, August. 2008.
  
- [18] K. Yasukawa, A. Forte and H. Schulzrinne "Distributed Delay Estimation and Call Admission Control in IEEE 802.11 WLANs," *Proceeding of the 2009 IEEE International Conference on Communications, IEEE ICC 2009, Ericsson Research Japan*, pp. 5057-5062, 18, June. 2009.

- [19] P. Wang, and W. Zhuang "A Token-Based Scheduling Scheme for WLANs Supporting Voice/Data Traffic and its Performance Analysis," *IEEE Transactions on Wireless Communications, Waterloo, Ontario, Canada*, Vol. 7, No 4, pp.1-11, April. 2008.
  
- [20] D. Leith, P. Clifford, D. Malone, and A. Ng, "TCP Fairness in 802.11e WLANs," *IEEE Communications Letters, Hamilton, Ireland*, Vol. 9, No. 12, pp. 1-3, December. 2005.
  
- [21] T. Li, Qiang Ni, D. Malone, D. Leith, Y. Xiao and T. Turletti, "Aggregation with Fragment Retransmission for Very High-Speed WLANs," *IEEE/ACM Transactions on Networking (TON), Piscataway, NJ, USA*, Vol. 17, No. 2, pp. 591-604, April. 2009.
  
- [22] M. Abusubaih, S. Wiethoelter, J. Gross, and A. Wolisz, "A new access point selection policy for multi-rate IEEE 802.11 WLANs," *International Journal of Parallel, Emergent and Distributed Systems, Berlin, Germany*, Vol. 23, No. 4, pp 1-20, August. 2008.
  
- [23] Mansor, S. A. (2009). Convergence: Going for Growth. myCONVERGENCE, 3(13).
  
- [24] Gurstein, M. (2010). Gurstein's Community informatics? Retrieved from <http://gurstein.wordpress.com/> on 15 Sep 2010.
  
- [25] A. Bailey, and O. Ngwenyama, "Social Ties, Literacy, Location and the Perception of Economic Opportunity: Factors Influencing Telecentre Success in a Development Context", *Proceedings of the 42nd Hawaii International Conference on System Sciences- 2009*, pp. 1-11, 2009.

- [26] D. Kleine, "ICT4What? - Using the Choice Framework to operationalise the Capability Approach to Development", *Proceeding* pp. 108-117.
- [27] H. Hansson, P. Mozelius, S. Gaiani, and N. Meegammana, "Women Empowerment in Rural Areas through the Usage of Telecentres - A Sri Lankan Case Study", *2010 International Conference on Advances in ICT for Emerging Regions (ICTer)*, pp. 1-6, 2010.
- [28] Aderinto, A. (2007). A Survey of The Reform Programmer. Nigeria's reform programme: issues and challenges, 66.
- [29] Beebe, J. (2001). Rapid assessment process: An introduction: AltaMira Press.
- [30] Copes, H., Vieraitis, L. M., River, N., & Hall, P. (2005). Evaluation Research in the Social Sciences: Upper Saddle River, NJ: Prentice Hall.
- [31] Creswell, J. W. (2007). Qualitative inquiry & research design: Choosing among five approaches: Sage Publications, Inc.
- [32] Kothari, C. (2008). Research methodology: methods and techniques: New Age International.
- [33] Patton, M. Q. (2002). Utilization-focused evaluation (U-FE) checklist. Evaluation Checklists Project.
- [34] Welman, C., Kruger, F., & Mitchell, B. (2005). Research methodology: Oxford University Press.
- [35] Yin, R. K. (2009). Case study research: Design and methods (Vol. 5): Sage publications, INC.